STRATEGIES TO REDUCE FALSE ALARMS TO THE TASMANIA FIRE SERVICE

EXECUTIVE DEVELOPMENT UNIT

By: Damien Killalea
Tasmania Fire Service
Tasmania, Australia

An applied research project submitted to the United States National Fire Academy
as part of the Executive Fire Officer Program

May 1998

Abstract

False alarms are a significant cost to fire services as they make up a large and growing proportion of calls attended. Reducing false alarms will enable fire services to re-allocate some emergency response resources to other productive community safety activities.

This paper employed historical research to establish the causes of false alarms, and evaluative research to identify potential solutions. Specifically, the paper addressed the following:

1. What are the major types of false alarms experienced by Tasmania Fire Service?
2. What strategies have fire services adopted to reduce these types of false alarms?
3. Which of these strategies are likely to be effective in the Tasmania Fire Service environment?

Emergency incident data was analysed to identify the nature of false alarms experienced by Tasmania Fire Service. Literature research and a survey of other Australian fire services was then carried out to compare those findings with the Tasmanian experience, and to identify potential solutions to the false alarm problem.

The major finding of the research was that most false alarms originate from automatic fire detection systems due to errors in design, installation and use. Strategies that address these three areas are likely to have a significant impact on the number of false alarms.

Recommendations to reduce false alarms focussed on (a) the development of closer working relationships between fire alarm designers, manufacturers, installers, maintenance companies, alarm subscribers and fire services to jointly develop better solutions, (b) the licensing of alarm installers and maintenance companies to mandate the application of appropriate standards of workmanship, (c) the provision of appropriate information to those who regularly

work in the vicinity of alarm systems, (d) the levying of charges for false alarms against alarm subscribers sufficient to act as a deterrent and to recover costs, and (e) the maintenance of existing strategies to reduce false alarms which arise from other sources.

Table of Contents

Introduction

False alarms typically account for a significant proportion of calls responded to by fire departments. These alarms tie up scarce fire department resources, rendering them unavailable for response to real emergencies until the nature of the alarm has been established. As they are responded to under emergency conditions, false alarms also expose firefighters and the community to unnecessary risk. In addition, false alarms significantly reduce the amount of time firefighters are able to devote to other useful community fire safety activities, and their own training and development.

The purpose of this research paper is to identify the causes of false alarms to Tasmania Fire Service, and to propose strategies to reduce them. The reduction of these alarms will enable some of the resources currently maintained for response to emergencies to be re-allocated to other productive activities.

Analysis of incident data will identify the causes of false alarms experienced by Tasmania Fire Service. Evaluative research of literature on false alarm causes and reduction strategies, coupled with a review of strategies adopted by other Australian fire services, will serve to identify the most appropriate strategies Tasmania Fire Service should adopt to reduce false alarms. Other fire departments that serve similar populations and experience similar problems may adapt these strategies for their own use.

Specifically, this paper will address the following questions:

1. What are the major types of false alarms experienced by Tasmania Fire Service?
2. What strategies have fire services adopted to reduce these types of false alarms?
3. Which of these strategies are likely to be effective in the Tasmania Fire Service environment?

Background and Significance

The State of Tasmania has a population of some 450 000 people. Tasmania Fire Service is the State's sole fire department and consists of 241 separate fire brigades. Four of these are located in the cities of Hobart, Launceston, Devonport and Burnie and are staffed by full-time career firefighters servicing a combined metropolitan population of approximately 290 000 people. The remaining 237 brigades are staffed exclusively by volunteer firefighters and are based in smaller towns and rural communities dispersed throughout the State. Volunteer brigades service a population of approximately 160 000 people.

Tasmania Fire Service is the lead combat authority for structural and wildland firefighting on all private lands, for managing incidents involving hazardous materials, and for urban search and rescue. The Service's firefighting responsibility extends over some 8000 square miles, or one third of the land area of Tasmania. Forestry Tasmania and the Parks and Wildlife Service are responsible for wildland firefighting over the balance of the State. The Tasmanian Ambulance Service provides emergency medical services and road accident rescue.

Of the 8446 emergency calls responded to by Tasmania Fire Service in 1996/97, 3692 or 43.7% were false alarms. Indeed, the number of false alarms in that year exceeded the number of actual fires responded to by brigades. For the station operating in the central business district of the capital city of Hobart, 68.8% of all responses for the three years to June 30 1997 were false alarms, an average of 989 false alarms per year for that station.

Attending to false alarms is essentially a non-productive activity for firefighters, and significantly reduces the life of firefighting apparatus. Reducing the number of false alarms in Tasmania will provide firefighters more time to develop their firefighting skills, and will enable

Tasmania Fire Service to reallocate staff and limited financial resources to pro-active community fire safety and prevention programs. Additionally,

> Fire crews responding under blue light conditions are placed at unnecessary risk in negotiating modern congested traffic conditions…other motorists and members of the public are similarly placed at risk when emergency vehicles respond to calls which subsequently turn out to have been originated by an unsatisfactory automatic fire detection system. ("National campaign to reduce false alarms," 1997, p. 5)

Also, says the Alarm Association of Florida, ("False fire alarm position paper," 1998, p. 1) citing the national "Quality Control of Automatic Fire Detection and Alarm Systems Installation" booklet, "False alarms are disruptive to building occupants. They can, over time, cause building occupants to ignore all alarms. Failure to respond to actual alarms can have disastrous consequences".

Previous efforts by Tasmania Fire Service to reduce false alarms, including fees levied against alarm owners and alarm maintenance companies for false alarms, have had only moderate success.

This paper aims to identify new strategies, or changes to existing ones, which Tasmania Fire Service and other similar fire services may adopt to further reduce false alarms and so enhance organisational capacity to meet the broader fire safety needs and expectations of the community.

This paper has been written to satisfy the requirements of the Executive Development Unit of the United States National Fire Academy's Executive Fire Officer Program. The Executive Development Unit encourages fire officers to exercise creativity and innovation in

problem solving. As Tasmania Fire Service and many other fire services have been plagued for some time with the problems associated with a high proportion of false alarms, a thorough research of the issue and the development of creative solutions is an extension of the Executive Development Unit.

Literature Review

A review of available literature on false alarms is summed up by the statement that "figures appear to be mainly due to errors made by detection equipment and mistaken calls of good intent by the public" ("Rise in fire calls," 1997, p. 7). This is supported by analysis of Tasmania Fire Service data; 62% of all false alarms are caused by faults in automatic fire detection systems (AFDSs), 28% are attributable to good intent calls from the public.

Despite improvements in AFDS design, the false alarms from this source continue to increase. "False calls from AFD systems have been increasing steadily in recent years" ("National campaign to reduce false alarms," 1997, p. 5). Indeed, almost all of the literature available on the subject of false alarms addresses problems associated with these systems.

False alarms originating from automatic fire detection systems

Because of the high proportion of false alarms that originate from AFDSs, there is little doubt that the task of reducing false alarms needs to focus on these systems. The aim is not only to reduce the number of incidents to which fire services respond, but also to ensure that AFDSs continue to be effective in warning people to evacuate buildings which *are* on fire, as "…unwanted fire signals bring the credibility of all automatic fire detection systems into disrepute…" ("National campaign to reduce false alarms," 1997, p 5). Ward (1997, p. 23) also warns "False alarms can significantly reduce confidence in any fire detection and alarm system.

They can lead to either unnecessary evacuation or the ignoring of a real alarm in the belief that it is 'probably just another false alarm'".

According to the International Association of Chiefs of Police "False alarms in perspective" (1998, p. 3) "The three main causes are technological errors, installation errors, and user errors…Technological errors appear to be on the decrease". Most writers agree that solutions to false alarms need to address three principal areas: automatic fire detection system design, system installation and system users.

Brasfield and Medley (1998) indicate that user error accounts for between 40% and 75% of false alarms from AFDSs. "Inadequate training and the complexity of some alarm system controls are often cited as causes of user-initiated false alarms. Installation errors account for the bulk of the remaining percentage". Brasfield and Medley (1998, p. 1)

> The community not only has to be informed about the problem but also educated on how they can help in the reduction of false alarms. Alarm organisations are very helpful in identifying certain problem areas (such as installation and equipment) and can help in educating the consumer. (Brasfield and Medley, 1998, p. 2)

Given the variety of causes of false alarms from AFDSs, it would appear that a comprehensive approach to the problem, addressing each of the three key areas, is required.

AFDS design problems

In recent years AFDSs have become increasingly sophisticated and complex in an effort to detect and report fires while at the same time reduce false alarms. Ward (1997, p. 23) says "One of the most significant advances in recent years has been the arrival of sophisticated analogue detection systems". These systems, which have yet to replace many of the older

systems that rely on the fire/no fire decision, have a separate decision-making component that continually samples the operating environment. The technological problems with AFDSs that give rise to false alarms tend to relate to the sensitivity of these newer analogue systems. Manufacturers are continually seeking to increase the sensitivity of AFDSs to detect and report fires sooner. “For a fire detector to be successful it must be as sensitive as possible, but the more sensitive it is the greater the likelihood of false alarms”. (“FSE tackle epidemic,” 1997, p. 3).

Although Phipps (1997, p. 31) says “…a properly maintained conventional system can still far outperform any addressable type in respect of prevention of false alarms”, this is no reason to discontinue the use of the newer analogue systems. While well-maintained older systems cause fewer false alarms, they are also likely to be slower in recognising and reporting a real fire.

> The answer lies in multisignature algorithms, which will allow one detector to analyse multiple sensory inputs to determine accurately whether a fire is in progress…The more variables the sensor looks at, the more accurately it can distinguish a fire from some other event…Using proper algorithms, an alarm can sense a fire from certain combinations of low-level detection, each of which alone is too low to indicate a fire. A good algorithm will not only reduce false alarms but will also improve detection of real fires. (Bernstein, 1998, p. 47)

Ultimately, more sensitive detectors combined with better algorithms will produce more effective AFDSs. However, some of the features now available in analogue systems to reduce false alarms are misunderstood by users, and often banned by fire services. Tilley (1997) states:

> The key to reducing unwanted alarms lies in education. Manufacturers now have the technology to reduce dramatically the incidence of false alarms, although the consultants, the alarm installers, the customers and the fire brigade are often unaware of the available technology or of how to use the systems to the best effect. (p. 14)

Tilley (1997) argues that features such as transmission delay units are often misunderstood by fire brigades, who consequently ban their use. Educating users about the features of newer systems that are designed to reduce false alarms pays dividends.

AFDS installation problems

Improper installation of AFDSs, and particularly more sensitive analogue systems, accounts for many false alarms to fire services. Phipps (1997) says

> "a majority of false alarms are actually caused by addressable and analogue addressable systems. Many problems result from initial installation of these systems by companies with engineers whom are inadequately trained and thus do not understand the importance of cable routes and noise interference". (p. 30)

Phipps (1997, p. 30) adds that other problems are caused when other works are carried out in the building, and an "unsuspecting contractor (fitting lighting or electrical items) runs new cabling next to fire alarm cables, thus causing eventual false alarm through interference". Phipps goes on to recommend training of the engineers so that the installation of addressable systems is not confused with conventional systems, as the installation requirements are totally different.

During and after installation, the sensitivity of modern systems can be adjusted to take environmental conditions into account, optimising system sensitivity while minimising false alarms. Tilley (1997, p 14) recommends that "…for the detector to give the best possible warning,

without false alarming, variable sensitivity should be considered". Careful consideration should be given to the operating environment to ensure that the earliest possible warning of fire is given with an absolute minimum of false alarms. Failure to attend to detector sensitivity at the time of installation, or failure to adjust it as the operating environment changes over time, can lead to poor detector sensitivity on the one hand and numerous false alarms on the other.

Problems caused by AFDS users

Solutions to false alarms caused by system users such as building occupants, system maintenance contractors and other maintenance contractors working in the building focus on the provision of advice and training.

> Owners and occupiers of protected premises must be educated into ensuring that their installations are regularly maintained…and that they contact their service company every time there was an unwanted alarm so that it could be investigated, the cause found and rectified ("National campaign to reduce false alarms," 1997, p. 6).

The writer adds that "User-friendly guidance for owners/occupiers of premises with automatic fire detection systems on relatively cheap ways of reducing the number of false alarms caused by the 'human element'" ("National campaign to reduce false alarms," 1997, p. 3) may include:

- advice on what type of detector is necessary,
- where it should be located,
- how it should be installed,
- how it should be maintained,
- what work practices it will and won't tolerate, and

- what steps to take if the system is likely to produce a false alarm given the existing circumstances.

Tilley (1997, p. 16) indicates that "A high proportion of problems are caused by a lack of servicing". Tilley recommends the appointment of a responsible person to ensure detector heads are maintained regularly.

The provision of training and advice to people involved in system design, installation and maintenance, as well as building occupants and fire services is a common theme running through the literature.

Other solutions to AFDS false alarms

Where there is the legislative power to do so, some fire services have elected to implement steps to reduce false alarms by levying fines against the owners or occupiers of buildings fitted with AFDSs, or against firms that maintain the systems. In Australia in 1989, the Victorian State Parliament enacted a statute empowering the Metropolitan Fire Brigades Board (now the Metropolitan Fire and Emergency Services Board) to "…levy fees and charges for attendance at a false alarm callout where it has determined that the owner/occupier of the premises did not have a 'reasonable excuse' for the alarm being given". (Metropolitan Fire Brigades Board "False alarms and false alarm charging" 1998, p. 1).

According to Herschfield (1995) the Metropolitan Fire Brigades Board imposes tough fines on building owners when AFDS false alarms occur. Fines equivalent to about US$200 per truck pre quarter hour have significantly reduced false alarms since the system was introduced in 1990. The US$7 million raised has been used to reduce the Board's debt. The Brigade's Geoff Godfreson quotes "We are the only Australian fire brigade to have a major reduction in the

number of false alarms". (Herschfield, 1995, p. 47). Herschfield adds that the brigade levies a higher false alarm fee than other Australian fire services, and vigorously pursues building owners whose AFDSs repeatedly offend.

The Board identifies "two main areas in which action may be taken to eliminate unnecessary false alarm calls:

1. Design, installation and maintenance of the system; and
2. Management of the system."

(Metropolitan Fire Brigades Board "False alarms and false alarm charging" 1998, p. 2).

The Board recommends that design, installation and maintenance of AFDSs should be in accordance with the relevant Australian Standard, and that training in and familiarisation of systems is essential, together with close supervision of all activities in the vicinity of systems which may activate the system. In contrast, Herschfield (1995) advises that:

> New Orleans did away with their false alarm ordinance after about a year. 'It was unenforceable', said the New Orleans superintendent of fire, Warren McDaniels. 'People blamed passing buses or lightning. Politicians, being the reactive people they are, repealed [the ordinance]'". (p. 46)

Clearly, legislation supporting the adoption of fines for AFDS users who cause false alarms needs to be carefully worded and needs the support of the courts.

Another way to reduce the cost of false alarms is to be selective about which alarm calls are responded to. Herschfield (1995) indicates that Denver Fire Department has considered not responding to alarms from AFDSs unless they are confirmed by a call from another source. A survey conducted in Denver indicated that all unconfirmed AFDS alarms turned out to be false,

while every confirmed AFDS alarm turned out to be a real fire. Others argue however that it is unlikely that confirming calls will be received in sufficient time when fires occur in unoccupied buildings or concealed spaces. Still others argue that it would be better for the fire department to initiate the confirming call if it were their policy not to respond immediately to alarms from AFDSs. A fire service considering adopting this strategy will need to be conscious of the political ramifications of failing to respond to an unconfirmed alarm call which ultimately results in the loss of life and/or property.

Solutions to non-AFDS false alarms

Raising the public's awareness of the cost of false alarms to the community is another solution to the problem. The Alarm Association of Florida ("AAF Public Service Campaign" 1998) recommends the use of public service announcements on radio stations to raise the community's awareness of the cost of false alarms, and individual's responsibilities for helping to reduce their number.

The problems experienced by fire services are similar to those experienced by police departments, and solutions may also be similar. The Madison Police Department is focussing on publicising the real costs of malicious false alarms in an effort to reduce the number experienced by the Department. In a two-pronged approach designed also to address false alarms from automatic systems, the Pennsylvania Legislature has been asked to consider adopting a law which will "…put the lion's share of responsibility for operation of a security system with the consumer. Fines will range from $100 - $300 for false alarms in excess of three for each 12 month period". (Madison Police Department ("Malicious False Alarms Cost Everyone" 1998, p. 1).

As it is likely that few members of the public are aware of the true cost of false alarms, raising their awareness may have a significant, though as yet unmeasured, impact.

Procedures

Definition of terms

AFDS (Automatic fire detection system) – a system designed to automatically detect and report fires in the early stages of development to building occupants and to the fire service. AFDSs include those activated by smoke, heat and fire, whether or not they are connected to a water sprinkler system.

Alarm subscriber – the owner or occupier of a building who owns and/or is responsible for the operation and maintenance of an AFDS, and for false alarms.

False alarm – the raising of an awareness of a situation which *prima facie* requires a fire service response, but which upon investigation requires no emergency intervention by the fire department.

Telephone caller line identification – a system that enables the address of a person reporting a fire by telephone to be identified.

Research methodology

Data analysis

To establish the size and nature of the problem presented by false alarms in Tasmania, an analysis was carried out by the writer in January and February 1998 of Tasmania Fire Service incident data for the 1996/97 financial year. This identified the proportion of calls responded to by brigades that were false alarms, and the causes of false alarms. Historical

incident data was also analysed to measure the impact over time of strategies to reduce false alarms; specifically, the impact of false alarm charges and the capacity to trace telephone calls to the centralised dispatch centre. Incident data has been collected by Tasmania Fire Service in accordance with Australian Standard 2577 'Australian Fire Incident Reporting System' since 1987.

Survey

The writer surveyed the twelve fire services responsible for fire emergencies in all Australian States and Territories in January 1998. The purpose of the survey was to establish the extent to which Australian fire agencies:

- serve similar populations and have similar emergency response mandates,
- have similar false alarm profiles, and most importantly,
- have developed effective measures to reduce false alarms.

Eleven fire services responded to the survey; details are included at Appendix B.

Literature research

The writer carried out a search in January and February 1998 of recent literature on the causes of false alarms, and strategies to reduce them. The literature search produced a number of journal articles from Australia and overseas, as well as articles available on the Internet. The literature was evaluated to identify the nature of the problems associated with false alarms, the causes of false alarms experienced by fire services (and to a lesser extent, police departments), and to identify strategies which may be effective in reducing false alarms in the State of Tasmania.

Assumptions and Limitations

The primary purpose of this paper is to identify strategies, based on strategies implemented in other Australian States and elsewhere, which will reduce the number of false alarms in Tasmania. Given different political, economic and social factors existing in different jurisdictions, strategies that work for some services may not work for others.

The survey of Australian fire services sought to identify problems associated with false alarms in those populations with a similar profile to Tasmania's population. The basis upon which the Australian fire services surveyed have differentiated between the percentage of their jurisdictions which are metropolitan/urban and rural was arbitrary. While the data represented in Figure 5 suggests a correlation between the percentage of the population that is urbanised and the percentage of calls which are false alarms, and the percentage of all calls which are caused by AFDS faults, the results need to be viewed in this context. Two services (Victoria's Country Fire Authority and the NSW Rural Fire Service), while providing a population estimate, provided no indication of the percentage that lives in metropolitan/urban areas. It is assumed that a significant proportion of the populations serviced by these two services are classified 'rural'.

Almost all of the literature focussed on the problems associated with false alarms generated by faulty AFDSs, reflecting the significant proportion of false alarms from this source. Little information on solutions addressing other causes was found in the literature.

Results

Research Question 1 - What are the major types of false alarms experienced by Tasmania Fire Service?

Analysis of Tasmania Fire Service incident data reveals the nature and magnitude of the problem that false alarms present to the Service. Of the 8446 emergency calls responded to by

Tasmania Fire Service in 1996/97, 3692 or 43.7% were false alarms (refer Figure 1). Indeed, the number of false alarms in that year exceeded the number of actual fires responded to by all brigades.

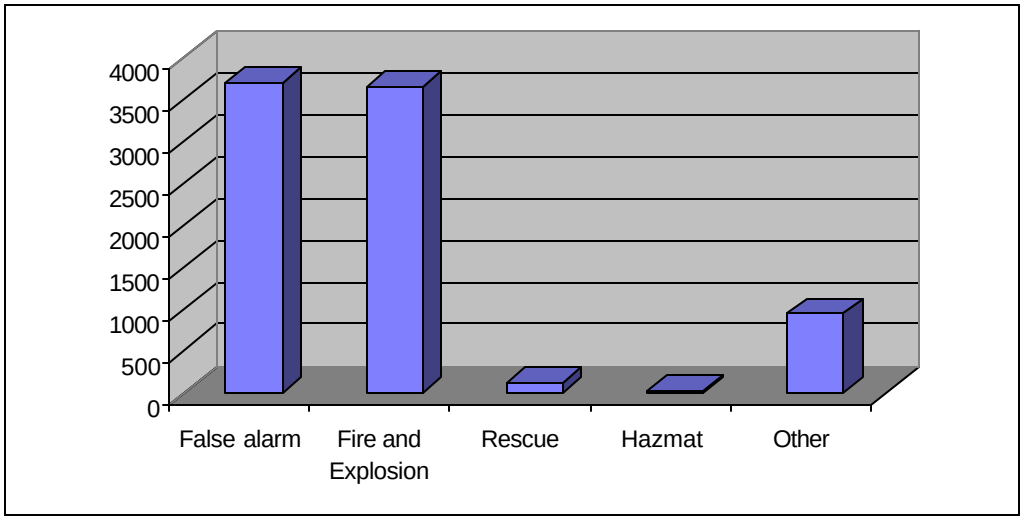


Figure 1
Number of incidents attended by Tasmania Fire Service 1996/97

The *type* of false alarms experienced by the Service is presented in Figure 2. False alarms, at least in England and Wales "appear to be mainly due to errors made by detection equipment and mistaken calls of good intent by the public" ("Rise in fire calls," 1997, p. 7). Indeed, 90% of all false alarms experienced by Tasmania Fire Service are from these two sources.

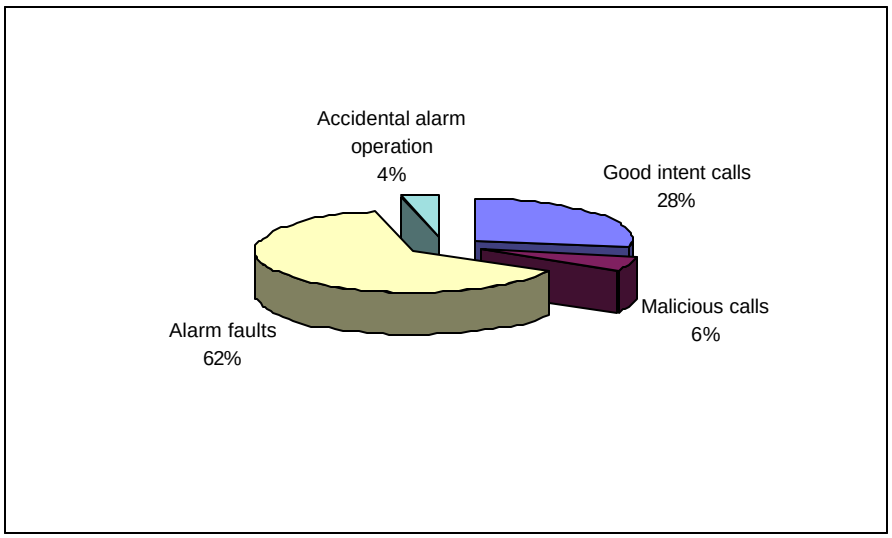


Figure 2
False alarms experienced by Tasmania Fire Service, by type – 1996/97

62% of all false alarms in Tasmania are initiated by faulty AFDSs. Compared to the experience in other parts of the world, this figure is high. For example, in 1993 in the United States, the largest single cause of false alarms, at 41%, was automatic fire alarm systems (Alarm Association of Florida "False fire alarm position paper," 1998). The London (England) Fire Brigade have experienced similar results; in 1995 42% of false alarms were attributed to AFDS alarms not directly related a to a real fire (Tilley, 1997). AFDS faults as a proportion of false alarms in Australia varied from 15% in a rural fire service to 78% in a service with a 100% urbanised population (refer Table 1).

Australian fire service	**% of population urbanised**	**AFDS faults (as % of false alarms)**
ACT Emergency Services Bureau	100	78
VIC MFESB	100	46
NSW Fire Brigades	91	53
QLD Fire & Rescue Service	79	55
Tasmania Fire Service	**78**	**62**
WA Fire & Rescue Service	76	41

NT Fire & Rescue Service	59	na
WA Bushfires Board	33	na
SA Country Fire Service	0	31
VIC Country Fire Authority	na	15
NSW Rural Fire Service	na	na
SA Metropolitan Fire Service	na	na

Table 1.
AFDS faults as a percentage of all false alarms, all Australian Fire Services

In 1996/97, of the 2694 AFDS alarms raised in Tasmania, 85% were false alarms. While this figure indicates that alarms from AFDSs are usually false, it needs to be considered in perspective; on average there are only 1.4 false alarms per AFDS monitored by Tasmania Fire Service.

Figure 3 identifies the broad property types from which AFDS false alarms in Tasmania originate.

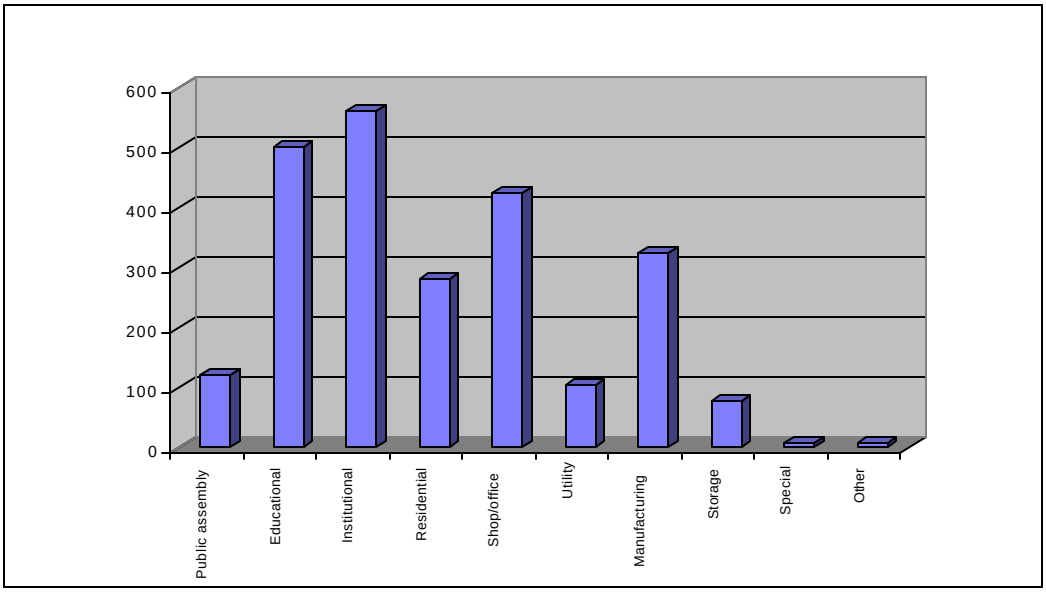


Figure 3
Number of AFDS false alarms by broad property type – Tasmania, 1996/97

Further analysis of these categories reveals that 73% of false alarms originate from five common property types (Figure 4). These include non-residential schools, tertiary institutions, aged care facilities, hospitals and offices.

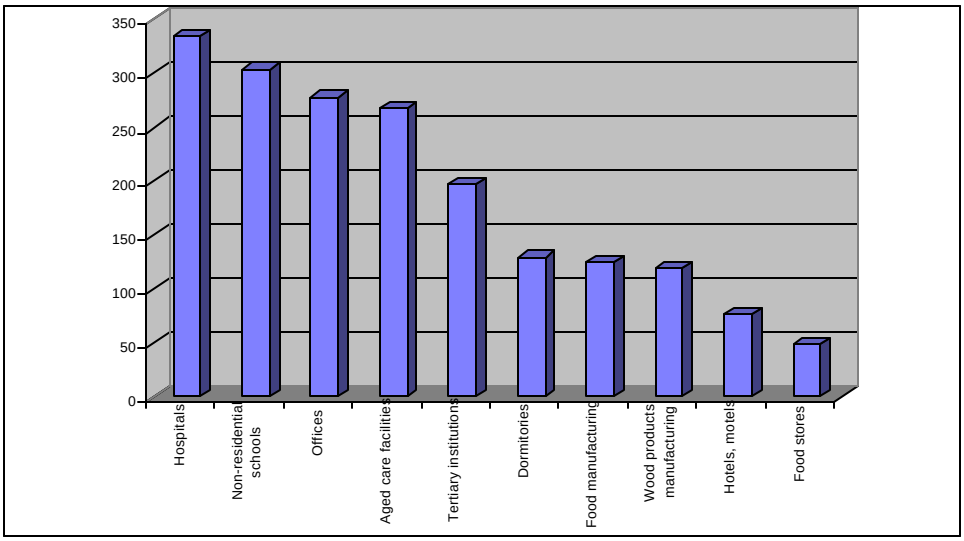


Figure 4
Number of AFDS false alarms by specific property use - Tasmania, 1996/97

Experience in England is similar:

> "…the Suffolk Fire Service confirmed that 90 per cent of installed AFD systems in the country did not give rise to any 'unwanted fire signals' during any of the years of investigation. It was clear that a relatively small number of 'unwanted fire signals' were the real 'problem children'". ("National campaign to reduce false alarms" 1997, p. 8).

Clearly, not all AFDSs cause problems. Those which *do* need to be the focus of attention.

From Figure 5, for the six Australian fire services with an urban population exceeding 75% of their total population, false alarms account for between 37% and 63% of all calls, with an average of 48% (Tasmania Fire Service – 44%).

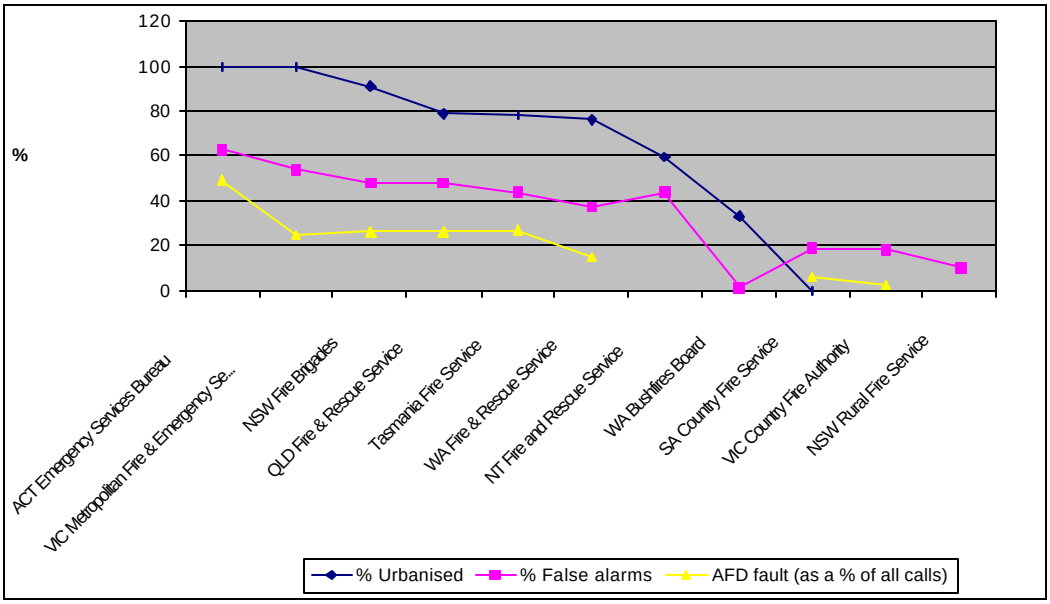


Figure 5
Correlation between urbanised population, false alarms and AFDS faults

These six fire services cover 14.5 million people or 82% of the Australian population. For these same six services, the average percentage of all calls which are attributable to AFDS faults is 25% (Tasmania Fire Service – 27%). Tasmania Fire Service is a 'typical' fire service with a slighter higher than average percentage of false alarms attributable to AFDS faults than other predominantly urban fire services in Australia.

The number of good intent calls by members of the Tasmanian public varies with the severity of the summer wildfire season. Good intent reports of wildfires decreased from 2142 in 1995/96 (a moderate wildfire season) to 752 in 1996/97 (a quiet wildfire season). Good intent calls accounted for 28% of all false alarms in 1996/97 (Figure 2).

The third highest category of false alarms at 6% is malicious false calls. Accidental operation of fire alarms makes up the balance of 4%.

Research Question 2 - What strategies have fire services adopted to reduce these types of false alarms?

A number of strategies for reducing false alarms are identified in the literature and/or have been implemented by Australian fire services (refer Appendix B, Figure 2). These strategies include:

- false alarm fees levied against alarm subscribers
- incentives for alarm subscribers to upgrade their alarm systems
- education of alarm subscribers on system maintenance and work practices
- false alarm fees levied against alarm installation and maintenance companies
- licensing of alarm installation and maintenance companies
- alarm monitoring by companies independent of fire services
- false alarm fees levied against alarm monitoring companies
- education programs addressing fire reporting by members of the public
- telephone caller line identification
- improved interrogation of callers by dispatch centre personnel
- legislative measures (eg, prohibition on making false reports of fire)

Fees levied by Tasmania Fire Service against subscribers of AFDSs for false alarms caused by system faults, and against alarm maintenance companies for false alarms caused during system maintenance, have restricted the increase in AFDS false alarms to 34% over the ten years to June 1997 (Figure 6).

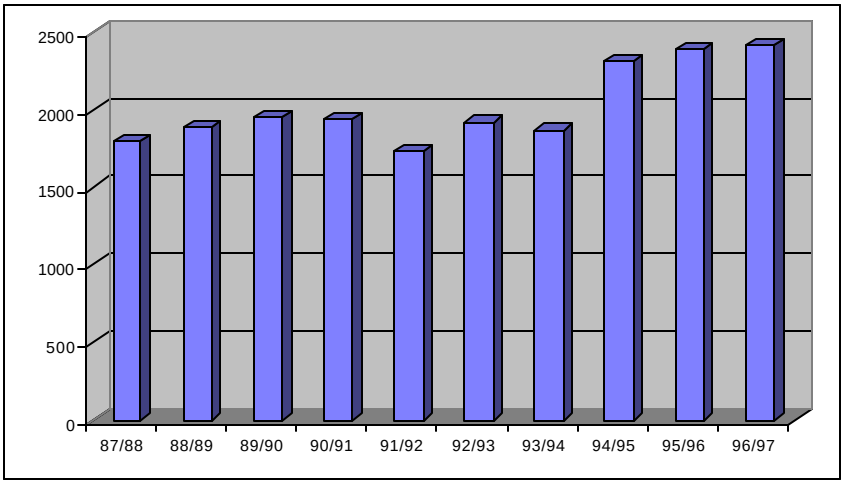
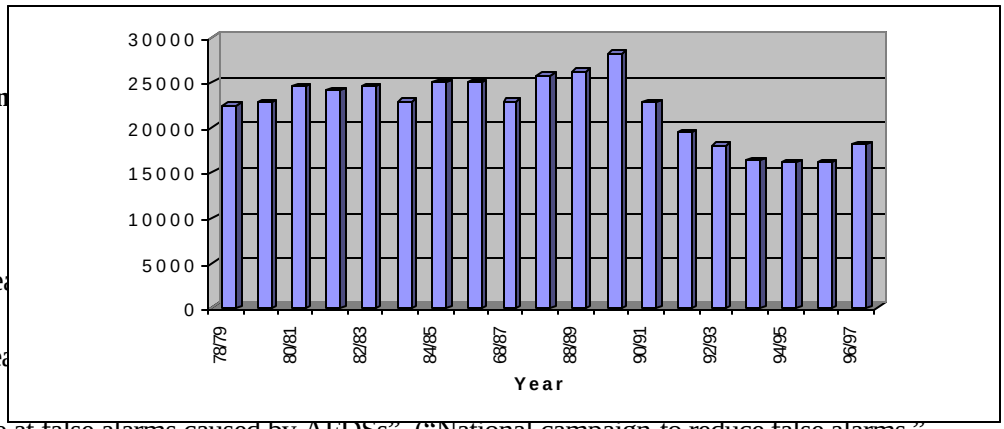


Figure 6
Number of AFDS false alarms to Tasmania Fire Service – 1987/88 to 1996/97

This is in stark contrast to results achieved by the Metropolitan Fire and Emergency Services Board of Melbourne, Australia since it introduced a similar system of charges for false alarms in 1990. This has resulted in a 64% *decrease* in false alarms over a similar period (Figure 7).



In

In

have increa

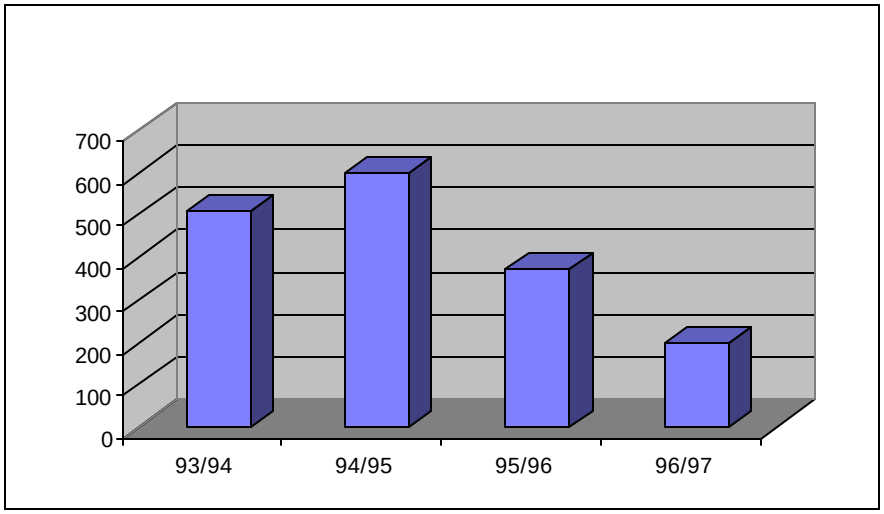
"the Appea

attendance at false alarms caused by AFDSs". ("National campaign to reduce false alarms," 1997, p. 5).

The levying of a fee against building owners for false alarms appears to have some impact on false alarms from AFDSs. Herschfield (1995) indicates that the fee levied by the Metropolitan Fire and Emergency Services Board of about US$200 per truck per quarter hour has significantly reduced false alarms. In contrast, Tasmania Fire Service levies a flat fee equivalent to only US$105 per false alarm, regardless of the resources used and the time taken.

Since the capacity to trace telephone callers reporting fires was established in the Tasmania Fire Service statewide dispatch centre in 1995, there has been a significant decrease in the number of false and largely malicious calls made direct to the centre (Figure 8).

Figure 8



Impact of 'telephone caller line identification' on mischievous false calls since its adoption by Tasmania Fire Service in 1995.

However, this has had little overall effect on the total number of false alarms as only a small proportion (6%) of all false alarms in 1996/97 were of a malicious nature.

Appendix B, Table 2 details the range of available strategies to reduce false alarms and indicates which have been adopted by Australian fire services. The number of strategies adopted range from 8 (NSW Fire Brigades and the Metropolitan Fire and Emergency Services Board,

covering the major metropolitan areas of Sydney and Melbourne respectively) to 1 (NSW Rural Fire Service). As a rule, the less urbanised the serviced population, the fewer the strategies adopted. Significant exceptions include the ACT Emergency Services Bureau which has an urbanised population of 100%, has only adopted 4 strategies and has the highest proportion of false alarms at 63%. Conversely, the Country Fire Authority of Victoria which has a large though unreported rural population has adopted seven different strategies and has a false alarm rate of only 18%.

Clearly, the adoption of a range of strategies is likely to be more effective in reducing false alarms than reliance on just a few.

Research Question 3 - Which of these strategies are likely to be effective in the Tasmania Fire Service environment?

The likely effectiveness of strategies covered in the literature search and survey of Australian fire services is discussed below.

Discussion

"There is no silver bullet that will stop false alarms in their tracks". (International Association of Chiefs of Police "False alarms in perspective" 1998, p. 5). Herschfield (1995, p. 46) concurs: "Fire officials don't always agree on everything, but they are unanimous on at least one point: False alarms are a big problem. The results of false alarms are frustrating at best, fatal at worst – and there is no definitive solution". Clearly, from both the literature search and survey results, there is no simple answer to reducing the impact of false alarms on the Tasmania Fire Service. Rather, a range of solutions may in concert make a useful contribution to reducing the burden. The focus needs to be on AFDSs, as these cause the majority of false alarms.

False alarm reduction strategies likely to be effective in Tasmania

While Tasmania Fire Service has taken a number of steps to reduce false alarms (refer Appendix B, Table 2) and is achieving moderate success *vis-a-vis* other fire services, significant improvements are likely if the Service enhances existing strategies and adopts others which are recommended in the literature and/or are proving successful in other jurisdictions.

Many writers suggest that fire services should work closely with AFDS designers and manufacturers to help develop better solutions to the false alarm problem. Jointly working to solve the issue of alarm sensitivity and a better understanding of the useful role played by addressable systems with pre-alarm facilities and variable sensitivity is likely to have a significant impact on false alarms transmitted to the fire service. However, "if the fire alarm industry is not made aware of any problem, how can it play its part in resolving it?" ("National campaign to reduce false alarms," (1997, p. 6). Given the high proportion of false alarms from new analogue systems, a significant amount of work is still required on system design, yet none of the fire services surveyed have adopted this cooperative approach. Tasmania Fire Service should initiate discussions with the fire alarm industry to identify issues where cooperation might benefit both parties.

Cholin and Moore (1997) recommend that complex fire alarm system design needs to be executed by a competent fire protection engineer, and that systems be properly installed. This view is supported in "National campaign to reduce false alarms," (1997, p. 5) which states "…the Liaison Forum's recommendation (is) that all automatic fire detection systems should be commissioned, installed and maintained to an approved standard by an independently certified company". Ensuring alarm installers and maintenance companies are competent makes good sense. While Tasmania Fire Service is the only Australian fire service to licence these companies

in an effort to reduce false alarms resulting from poor workmanship, it needs to develop still closer relationships as problems continue to persist. Again, sharing information with alarm installers and maintenance companies is likely to reduce false alarms from this source.

Both the literature and survey supports the view that training of system users should have a significant impact on false alarms; in particular, informing users about the sensitivity of alarms to changes in their operating environment caused by nearby activity. Few Australian fire services have developed comprehensive training programs of this type, although several are planning to extend their industry training programs by involving firefighting personnel. Tasmania Fire Service could benefit by offering training programs to alarm subscribers aimed at reducing false alarms due to work practices that create environments that AFDSs cannot tolerate. Those systems that do cause multiple false alarms should be identified from Tasmania Fire Service incident data and appropriate measures put in place to address them.

Where legislation permits, the use of increased penalty fees for false alarms will give alarm subscribers and maintenance companies increased 'ownership' of the problem and provide a greater incentive to seek their own solutions to false alarms. Both the literature and survey results indicate that where fire services are able to levy modest charges for false alarms caused by AFDSs, the rate of false alarms has risen only moderately. Where charges have been significant, the number of false alarms has decreased markedly. In contrast, where fees are not levied, the number of false alarms from AFDSs has risen considerably. Tasmania Fire Service should review the magnitude of its false alarm charges to increase the incentive for alarm subscribers to tackle the problem.

No support for *not* attending alarms of fire was found in either the literature or the survey, although Denver Fire Department has considered this option (Herschfield, 1995). Current

legislation mandates that Tasmania Fire Service responds to all alarms of fire, including those which subsequently turn out to be false (Fire Service Act 1979, s. 29). Tasmania Fire Service would need to consider carefully the potential political and social implications of not responding to AFDSs before adopting this strategy.

Both the potential positive and negative outcomes of community service announcements referred to in the literature to publicise the cost of false alarms need to be considered. It is likely that some members of the community will be encouraged to make malicious calls, perhaps outweighing the benefits of the program. There was little evidence in the literature supporting this strategy although about half Australian fire services conduct at least some community education about fire reporting. Other strategies address the problem malicious calls present to Tasmania Fire Service, and while good intent calls form a significant proportion of false alarms in busy wildfire seasons, encouraging citizens *not* to report fires isn't where significant improvements will be made.

Recommendations

Adoption of the following recommendations is likely to reduce the number of false alarms experienced by Tasmania Fire Service.

1. Tasmania Fire Service should undertake cooperative research with AFDS designers and manufacturers and share collective knowledge and experience to reduce false alarms from analogue systems while improving system effectiveness.

2. The process of licensing AFDS installers and maintenance companies should be extended to mandate training and competency in the installation and maintenance of both conventional and analogue addressable systems.

3. Building owners and managers should be encouraged to install new analogue addressable systems with inherent false alarm reduction features such as pre-alarm facilities and variable sensitivity. Tasmania Fire Service brigades should be informed on the benefits of these features.

4. Tasmania Fire Service should monitor AFDS installation and maintenance to ensure it complies with Australian Standards, and re-issue licences only to those who continue to meet the Standards.

5. Alarm subscribers should receive training that equips them with the knowledge and skills necessary to reduce the incidence of AFDS false alarms. Training should include advice on what type of detector is appropriate, where it should be located, how it should be installed and maintained, what work practices it will and won't tolerate, and what steps to take if the system produces a false alarm.

6. Fees levied against alarm subscribers and alarm maintenance companies for AFDS false alarms should be increased to reflect the true cost of responding to false alarms.

7. Tasmania Fire Service should continually analyse AFDS false alarm data so that alarm systems at sites causing frequent false alarms can be targeted for early and specific attention.

8. Tasmania Fire Service should analyse false alarm data to establish the proportion of - unconfirmed AFDS alarms that are false, and the proportion of confirmed AFDS alarms that are not false. The Service should then consider risk management principles and the political

and social ramifications of not responding to AFDS alarms before deciding if it will continue to respond to all AFDS alarms. Support of the legislature will be required for this initiative.

9. Tasmania Fire Service should continue the current practice of identifying telephone callers' phone numbers, and interrogating callers for details of reported emergencies.

10. Tasmania Fire Service should weigh up the benefits of community service announcements to inform the public on the real costs of false alarms, including malicious calls, before making a decision on the implementation of this strategy.

References

Alarm Association of Florida. (January 7 1998). AAF Public Service Campaign. [On-line] Available: http://www.fla-alarms.org/false/camp.f.html

Alarm Association of Florida. (January 7 1998). False Fire Alarm Position Paper. [On-line] Available: http://www.fla-alarms.org/false/position.false.f.html

Alarm Association of Florida. (January 7 1998). Pennsylvania Seeks Statewide False Alarm Ordinance. [On-line] Available: http://www.fla-alarms.org/false//pennsylv.html

Bernstein, D. S. (1998). The End of False Alarms? NFPA Journal, January/February 1998, 47-49.

Brasfield, M. D., & Medley, S. (January 21 1998). False Alarms: A Growing Problem. [On-line] Available: http://info.ci.ftlaud.fl.us/police/alrmartc.html

Cholin, J. M., & Moore, W. D. (1997, January/February). How Reliable is Your Fire Alarm System? NFPA Journal, 89, (1), 49-53.

Fire Service Act 1979

FSE Tackle Epidemic Level of False Alarms. (1997, October). Fire, 90, (1108), 3.

Herschfield, V. (1995, January/February). How the Fire Service Responds. NFPA Journal, 89, (1), 46-49.

International Association of Chiefs of Police. (January 6 1998). False Alarms in Perspective. In False alarm perspectives: A solution-oriented resource. [On-line] Available: http://www.amdahl.com/ext/iacp/pslc5.toc.html

Madison Police Department. (January 6 1998). Malicious False Alarms Cost Everyone! [On-line] Available: http://www.ci.madison.wi.us/fire/falseala.html

Metropolitan Fire Brigades Board. (January 6 1998). False Alarms and False Alarm Charging. Emergency Response [On-line] Available: http://www.mfbb.vic.gov.au/false.htm

National Campaign to Reduce False Alarms from AFDSs. (1997, December). Fire, 90, (1110), 5-8.

Phipps, R. P. (1997, December). Combating False Alarms [Letter to the editor]. Fire Safety Engineering, 4, (6) 30-31.

Rise in Fire Calls as Brigade Staff Numbers Fall. (1997, January/February). Fire Prevention, 296, 7.

Tilley, G. (1997, July/August) Managing False Alarms. Fire Prevention, 301, 14-16.

Ward, M. (1997, October). Defending the Realm. Fire Prevention, 303, 23-24.

Appendix A – Sample Survey

TASMANIA FIRE SERVICE

COMMUNITY FIRE SAFETY

Cnr Argyle & Melville Sts, Hobart 7000
Phone: (03) 62 308612 Fax: (03) 62 346647

November 2, 2000

Mr I D MacDougall A C
Commissioner
New South Wales Fire Brigades
Box A249 PO
SYDNEY SOUTH NSW 2000

Fax: (02) 9265 2988

Dear Mr MacDougall

Re: US National Fire Academy Executive Fire Officer Program

I am an Australian student representing the Australasian Fire Authorities Council and the Tasmania Fire Service at the United States National Fire Academy's Executive Fire Officer Program (EFOP) at Emmitsburg in Maryland.

As part of the requirements of the Executive Development Unit of EFOP, I am required to complete an applied research project. Specifically, I am researching strategies adopted by fire services both in Australia and overseas which have had a marked impact on reducing the number of false alarms responded to by those agencies. Accordingly I enclose a survey which will enable me to gain an understanding of the causes of false alarms, and the usefulness of mitigation strategies which have been adopted by Australian fire services.

Please take the time to have the survey completed and returned to me by January 30 1998 so that my deadline of mid-February may be met. It is likely that fire safety personnel and/or your service's statisticians will be able to provide the information I am seeking.

I can be contacted on (03) 6230-8612 or (0418) 129-814 should you require any clarification. My mailing details are included on the survey form.

Yours sincerely

Damien Killalea
Director
Community Fire Safety

enc.

United States National Fire Academy

Executive Fire Officer Program

Survey of False Alarm Reduction Strategies Adopted by Australian Fire Services

Thank you for taking the time to complete this survey. To facilitate its completion and to maintain consistency across agencies, Australian Incident Reporting System (AIRS) codes (1992 version) are supplied for questions 2&3, to distinguish between data types. Providing question 2 is answered, answers to questions 3&4 may be expressed either as a percentage or an absolute number.

Information collected will be aggregated and individual fire agencies will not be identified.

Question 1 – Population serviced by agency:
What is the approximate population serviced by your agency?

Metropolitan/urban …….

Rural …….

Question 2 – Number of incidents attended:

For the year to June 30 1997, how many incidents did your agency respond to? …….

Question 3 - Type of incidents attended:

For the year to June 30 1997, how many incidents of the following types did your agency respond to?

Fire and explosion (A23 codes 10-19) …….

Hazmat (A23 code 47) …….

Rescue (A23 codes 30-39) …….

False alarm (A23 codes 60-89) …….

Other (A23 codes 20-29, 40-46, 48-59, 90-99, 00) …….

Question 4 – False alarm causes:

For the year to June 30 1997, how many false alarms of the following types did your agency respond to?

Accidental manual operation of fire alarm (A23 code 67) …….

Failure to notify of fire alarm test (A23 code 68) …….

Other manually initiated, non-malicious false alarm (A23 codes 60-66, 69) …….

Malicious false alarm (A23 codes 70-79) …….

Fire alarm system malfunction (A23 codes 81-85) …….

Accidental system-initiated operation of fire alarm (A23 code 86) …….

Other system initiated false alarm (A23 codes 80, 89) …….

Question 5 – False alarm reduction strategies:

What steps are currently being taken to reduce the number of false alarms responded to by your agency? (please tick)

- False alarm fees levied against fire alarm subscribers ☐
- Measures to have fire alarm subscribers upgrade alarm systems ☐
- Education of fire alarm subscribers ☐
- False alarm fees levied against fire alarm maintenance companies ☐
- Accreditation of fire alarm maintenance companies ☐
- Alarm monitoring other than by fire agency ☐
- False alarm fees levied against fire alarm monitoring companies ☐
- Cooperative research with fire alarm manufacturers ☐
- Community education programs addressing emergency reporting by individuals ☐
- Telephone caller line identification (CLI) ☐
- Improved interrogation of callers ☐
- Legislative measures (eg, false alarm penalties, restrictions on backyard burning) ☐
- Other (please specify) .....

Question 6 – Strategy effectiveness:

Please select the three strategies that have had the most impact on reducing false alarms, and describe them below. What false alarm cause(s) have they addressed? How big an impact have they had?

Strategy 1. .....

.....

.....

.....

.....

Strategy 2 .....

.....

.....

.....

.....

Strategy 3 .....

.....

.....

.....

.....

Question 7 – Further initiatives:

What other steps do you plan to take to further reduce the incidence of false alarms?

.....

.....

.....

.....

.....

.....

.....

.....

.....

Further comments:

.....

.....

.....

.....

.....

.....

Thank you for completing the survey. **Please return it by fax or mail by Friday 30 January to:**

Damien Killalea
Director, Community Fire Safety
Tasmania Fire Service
GPO Box 1526R
Hobart, TAS 7001

Facsimile (03) 6234 6647

Appendix B

Survey results

Described below is the range of false alarm reduction strategies that have been adopted or are planned by Australian fire services, as indicated in survey responses. Some indication is given of the success of these strategies. A summary of the strategies is provided in Table 2.

The **Metropolitan Fire and Emergency Services Board** report that significant improvements have been achieved through the levying of charges for AFDS false alarms and the provision of advice to alarm subscribers. Exemptions on charges have been granted in some instances to subscribers who have been prepared to replace thermal or smoke alarm systems with sprinkler systems. Future plans include greater involvement from firefighters in the education strategy so that more subscribers and alarm and building maintenance contractors are reached. The Board has a Fire Alarm Assessment Section dedicated to reducing the incidence of false alarms.

While the **NSW Fire Brigades** reported an initial decrease in false alarms following the adoption of charges for excessive false alarms, they have subsequently experienced an increase in both the number and proportion of these types of alarms. No explanation was given. Although telephone caller line identification has been implemented, no documentation of its impact on false alarms was available. Similarly, the impact of an education program aimed at staff in areas from which large proportions of false alarms originate had not been measured. NSW Fire Brigades plan to use firefighters to extend the education strategy to include site visits and the provision of advice to alarm subscribers causing multiple false alarms.

The **Queensland Fire and Rescue Service** strategy of charging alarm subscribers a fee for false alarms is currently under review.

The **Fire and Rescue Service of Western Australia** reports that the use of telephone caller line identification has reduced false alarms to their service by 35%. Education programs by firefighters backed up by fire safety officers and alarm technicians are showing promising results. Compensating chambers and other delay devices are reducing false alarms caused by water pressure fluctuations in sprinkler systems. Future plans include an increased emphasis on education programs, and steps to encourage the use of more intelligent alarm systems.

The **Country Fire Authority of Victoria** expects to reduce the number of false alarms resulting from malicious telephone calls through the use of telephone caller line identification. Strategies to reduce false alarms from AFDSs include increased penalty charges, and legislative measures to force alarm subscribers to upgrade or maintain their systems. Brigade personnel are working to inform their local communities about what is appropriate to report and what is not. Due to the relatively high proportion of false alarms from hoax callers, future efforts are likely to focus on more determined use of telephone caller line identification.

The **Northern Territory Fire and Rescue Service** introduced charges against alarm maintenance companies for false alarms. While there were positive changes during the first six months, the impact of this strategy is negligible. Telephone caller line identification has caused a significant reduction in '000' (911) calls. The impact of legislation introduced in 1996 to limit backyard burning and mandate permits for burning off has yet to be measured. A new alarm monitoring system relying on telemetry rather than landlines to transmit signals to the Fire Service is expected to reduce false alarms from AFDSs caused by power surges and lightning strikes.

The Service recommends the assignment of responsibility for addressing false alarms to a single person.

Only 1.3% of calls experienced by the **Western Australian Bushfires Board** are false alarms, due mainly to the low urbanised population serviced and the lack of AFDSs that are monitored. Low key strategies adopted (refer Table 2) in conjunction with the Fire and Rescue Service of Western Australia are reportedly having the desired effect.

The **Country Fire Service of South Australia** reports that alarm fees levied on subscribers experiencing numerous calls (particularly hospitals and aged care homes) have had a dramatic effect in reducing false alarms. While that Service has the legislative power to force subscribers to update their alarm systems, it is rarely enforced. Rather, voluntary compliance with legal requirements is reported to have been reasonably effective. Further efforts include the use of firefighting personnel to educate alarm subscribers, particularly in hospitals and other institutions where accommodation is provided overnight.

The **NSW Rural Fire Service** does not monitor AFDSs. Consequently, efforts to reduce false alarms focus on community education to ensue only actual emergencies get reported.

Tasmania Fire Service is the only fire service in Australia to register AFDS installers and maintenance companies. This is a legislated power and is exercised to ensure that only those companies with appropriate expertise are registered in the first instance. Continued registration is on the bases that alarm installation and maintenance is of a high standard. False alarm fees levied against fire alarm subscribers and maintenance companies have been moderately effective in limiting the increase in false alarms from these sources. Telephone caller line identification and

improved interrogation of callers by dispatch centre staff has significantly reduced the incidence of malicious false alarms.

The **Metropolitan Fire Service of South Australia** did not respond to the survey.

No survey respondents, including Tasmania Fire Service, participate in any cooperative research with fire alarm manufacturers.

Table 2 - False alarm reduction strategies adopted by Australian fire services x = strategy has been adopted	% population which is urbanised	% calls which are false alarms	False alarm fees against alarm subscribers	Incentives for alarm subscribers to upgrade systems	Education of fire alarm subscribers	False alarm fees against alarm maintenance companies	Accreditation of fire alarm maintenance companies	Alarm monitoring other than by fire agency	False alarm fees against alarm monitoring companies	Cooperative research with fire alarm manufacturers	Education programs addressing fire reporting by individuals	Telephone caller line identification	Improved interrogation of callers	Legislative measures
ACT Emergency Services Bureau	100	63						x				x	x	x
VIC Metropolitan Fire & Emergency Services Board	100	54	x	x	x	x		x				x	x	x
NSW Fire Brigades	91	48	x	x	x			x			x	x	x	x
QLD Fire & Rescue Service	79	48	x		x						x	x	x	x
Tasmania Fire Service	78	44	x			x	x					x	x	x
WA Fire & Rescue Service	76	37		x				x	x			x	x	
NT Fire and Rescue Service	59	44				x						x		x
WA Bushfires Board	33	1.3									x	x	x	x
SA Country Fire Service	0	19	x	x	x									
VIC Country Fire Authority	na	18	x	x				x			x	x	x	x
NSW Rural Fire Service	na	10									x			